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FONTANA LAKE, SWAIN AND GRAHAM COUNTIES, NORTH CAROLINA

Pacific Northwest Environmental Research Laboratory

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NATIONAL EUTROPHICATION SURVEY

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16. ABSTRACT

Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivided according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

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ON
FONTANA LAKE
SWAIN AND GRAHAM COUNTIES
NORTH CAROLINA
EPA REGION IV
WORKING PAPER No. 379

WITH THE COOPERATION OF THE

NORTH CAROLINA DEPARTMENT OF NATURAL AND ECONOMIC RESOURCES

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FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to fresh water lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's fresh water lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the North Carolina Department of Natural and Economic Resources for professional involvement and to the North Carolina National Guard for conducting the tributary sampling phase of the Survey.

Lewis R. Martin, Director of the Division of Environmental Management; Darwin L. Coburn, Chief of the Water Quality Section; and Julian R. Taylor, Supervisor of the Monitoring Program Unit; provided invaluable lake documentation and counsel during the Survey, reviewed the preliminary reports and provided critiques most useful in the preparation of this Working Paper series.

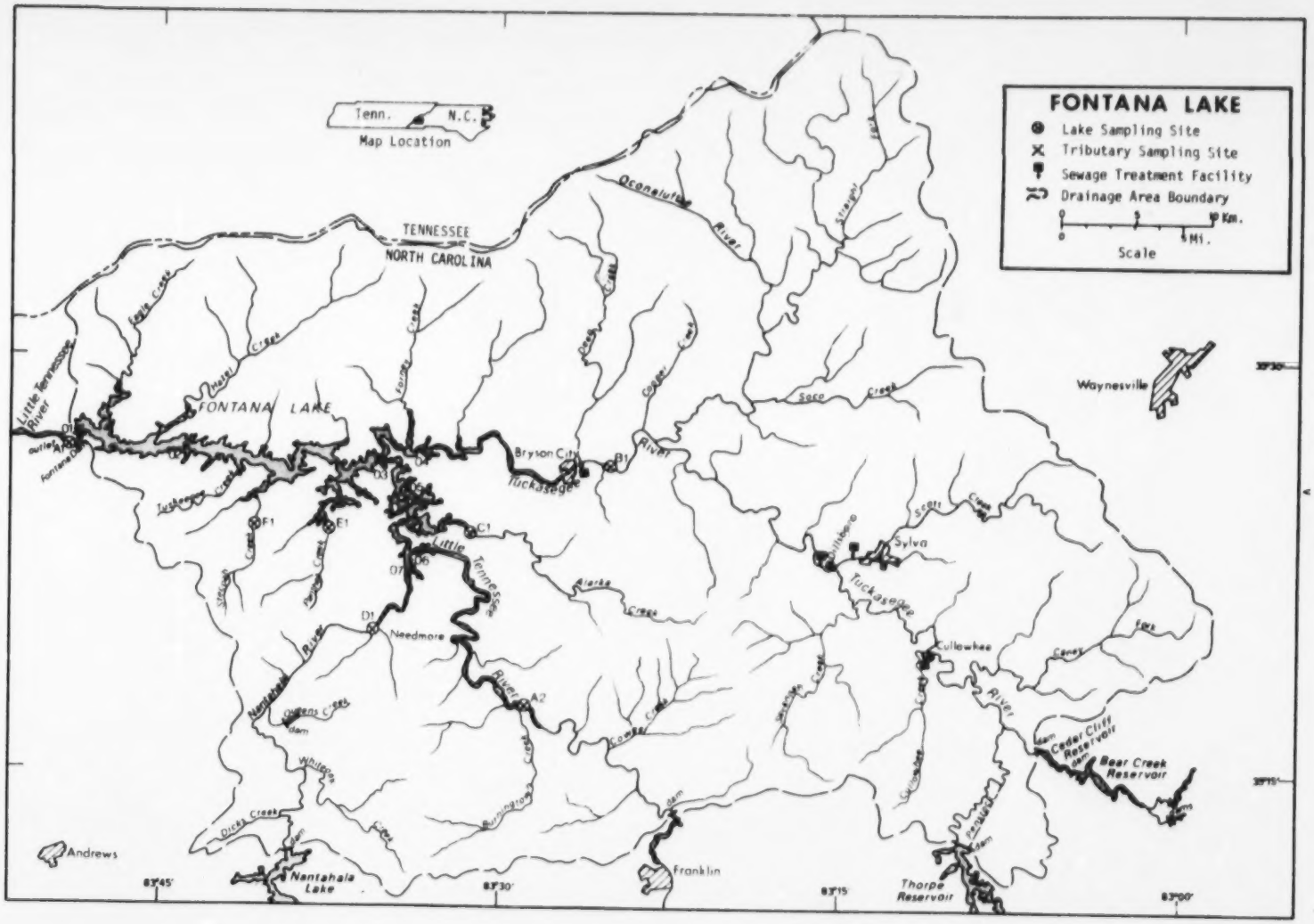
Major General William M. Buck, formerly Adjutant General of North Carolina, and Project Officer Colonel Arthur J. Bouchard, who directed the volunteer efforts of the North Carolina National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF NORTH CAROLINA

LAKE NAME	COUNTY
Badin	Montgomery, Stanly
Blewett Falls	Anson, Richmond
Chatuge	Clay, NC; Towns, GA
Fontana	Graham, Swain
Hickory	Alexander, Caldwell, Catawba
High Rock	Davidson, Rowan
Hiwassee	Cherokee
James	Burke, McDowell
John H. Kerr (Nut Bush Creek)	Granville, Vance, Warren, NC; Halifax, Mecklenburg, VA
Junaluska	Haywood
Lookout Shoals	Alexander, Catawba, Iredell
Mountain Island	Gaston, Mecklenburg
Norman	Catawba, Iredell, Lincoln, Mecklenburg
Rhodhiss	Burke, Caldwell
Santeetlah	Graham
Tillery	Montgomery, Stanly
Waccamaw	Columbus
Waterville	Haywood
Wylie	Gaston, Mecklenburg, NC; York, SC


FONTANA LAKE
Lake Sampling Site
Tributary Sampling Site
Sewage Treatment Facility
Drainage Area Boundary
Scale
Tenn.
N.C.
Map Location
TENNESSEE
NORTH CAROLINA
FONTANA LAKE
Little Tennessee River
Oconaluftee River
Tuckasegee River
Little Tennessee River
Nantahala River
Bryson City
Needmore
Sylva
Cullowhee
Waynesville
Andrews
Nantahala Lake
Franklin
Thorpe Reservoir
Cedar Cliff Reservoir
Bear Creek Reservoir
Fontana Dam
Fontana Lake
Eagle Creek
Hazel Creek
Forney Creek
Deep Creek
Cooper Creek
Soco Creek
Scott Creek
Caney Fork
Alarka Creek
Cowee Creek
Burningtown Creek
Queens Creek
Whiteoak Creek
Dicks Creek
Stecoah Creek
Tuskeegee Creek
Sevenmile Creek
Cullowhee Creek
Pensacola Creek
Straight Fork
A1
A2
B1
C1
D1
D3
D4
D6
D7
E1
F1
83°45'
83°30'
83°15'
83°00'
35°30'
35°15'

FONTANA LAKE

STORET NO. 3704

I. CONCLUSIONS

A. Trophic Condition:

Survey data indicate that Fontana Lake is mesotrophic. It ranked fifth in overall trophic quality when the 16 North Carolina lakes sampled in 1973 were compared using a combination of six parameters*. None of the other lakes had less but one had the same median total phosphorus, six had less and one had the same median orthophosphorus, ten had less median inorganic nitrogen, none had less mean chlorophyll a, and only one lake had a greater mean Secchi disc transparency.

The anoxic water stratum reported by Louder and Baker (1966) was evident during the August Survey sampling at stations 1, 2, 3, and 4 and again in October at stations 1 and 2 (see data in Appendix D).

Survey limnologists did not observe any concentrations of algae or macrophytes.

B. Rate-Limiting Nutrient:

The algal assay results indicate that Fontana Lake was phosphorus limited at the time the sample was collected (06/02/73). The lake data further substantiate limitation by phosphorus; i.e.,

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* See Appendix A.

the mean inorganic nitrogen to orthophosphorus ratios were 71 to 1 or higher at all sampling times.

C. Nutrient Controllability:

1. Point sources--During the sampling year, the phosphorus contributions of point sources amounted to 5.0% of the total load reaching Fontana Lake. The origins were the wastewater treatment facilities at Western Carolina University in Cullowhee (2.1%), Bryson City (1.2%), Sylva (1.4%), and Dillsboro (0.3%). The present loading rate of 2.88 $g/m^2/yr$ is 1.7 times the rate proposed by Vollenweider (Vollenweider and Dillon, 1974) as a eutrophic rate (see page 15). Since the lake is phosphorus limited and currently receives a relatively high phosphorus load, all phosphorus inputs should be minimized to reduce the eutrophication rate to the greatest possible extent to preserve the existing high water quality of Fontana Lake.

2. Non-point sources--The mean annual contribution from non-point sources represented 95.0% of the total phosphorus load impacting Fontana Lake. The Little Tennessee River contributed 42.2%; the Tuckasegee River, 34.0%; the Nantahala River, 4.2%; and the three other gaged tributaries collectively contributed 3.3% of the total. The contributions from ungaged tributaries were estimated to be 10.7% of the total load.

The non-point phosphorus export rate of the Little Tennessee River was 46 $kg/km^2/yr$ during the sampling year. This rate is somewhat higher than the export rates of the other Fontana Lake tributaries (see page 15). However, this river basin is quite large, and there may have been unmeasured point sources outside the vicinity of Fontana Lake which increased the export rate. Generally, the export rates of Fontana Lake tributaries were comparable to the rates of tributaries to nearby Hiwassee Lake* (mean = 18 $kg/km^2/yr$; range of 10 to 37 $kg/km^2/yr$) and Santeetlah Lake** (mean of 17 $kg/km^2/yr$; range of 5 to 38 $kg/km^2/yr$); and it appears that such export rates are typical for western North Carolina streams.

There was a substantial annual nitrogen loss from Fontana Lake which could very probably be explained by the situation in the Tuckasegee River Arm of the Reservoir as described by Louder and Baker (op. cit.). The Tuckasegee Arm of the Reservoir apparently has extensive sludge deposits, presumably from municipal and/or industrial wastes, which cause the anaerobic stratum in the lake reported by the authors and detected during the Survey. Under anaerobic conditions, ammonia-nitrogen could be solubilized from the bottom sludges which would result in an internal contribution to the total nitrogen load and therefore

* Working Paper No. 382.
** Working Paper No. 389.

account for the imbalance of nitrogen discharged from the lake versus external nitrogen loadings to the lake.

The nitrogen export rate of the Tuckasegee River basin was extremely high (1,503 $kg/km^2/yr$), and ammonia concentrations in the river were also high though the phosphorus export rate was in the normal range. This indicates either that an upstream point source was contributing excessive loadings of nitrogen to the basin or that substantial quantities of nitrogen were being solubilized from sediments within the river.

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS†

A. Lake Morphometry††:

1. Surface area: 43.18 kilometers^2.
2. Mean depth: 41.3 meters.
3. Maximum depth: 134.1 meters.
4. Volume: 1,782 x 10^6 m^3.
5. Mean hydraulic retention time: 179 days (based on outlet flow).

B. Tributary and Outlet:
(See Appendix C for flow data)

1. Tributaries -

Name	Drainage area (km^2)*	Mean flow (m^3/sec)*
Little Tennessee River	1,139.6	29.6
Tuckasegee River	1,706.8	43.6
Alarka Creek	80.8	3.0
Nantahala River	427.3	15.6
Panther Creek	28.7	0.6
Stecoah Creek	27.2	1.0
Minor tributaries & immediate drainage -	615.3	21.4
Totals	4,025.7	114.8

2. Outlet -

Little Tennessee River	4,068.9**	115.5

C. Precipitation***:

1. Year of sampling: 147.7 centimeters.
2. Mean annual: 120.6 centimeters.

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† Table of metric conversions--Appendix B.
†† Louder and Baker, 1966.
* For limits of accuracy, see Working Paper No. 175, "...Survey Methods, 1973-1976".
** Includes area of lake.
*** See Working Paper No. 175.

III. LAKE WATER QUALITY SUMMARY

Fontana Lake was sampled three times during the open-water season of 1973 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from seven stations on the lake and from a number of depths at each station (see map, page v). During each visit, a single depth-integrated (4.6 m to surface) sample was composited from the seven stations for phytoplankton identification and enumeration; and during the first visit, two 18.9-liter depth-integrated samples were composited for algal assays. Also each time, a depth-integrated sample was collected from each of the stations for chlorophyll a analysis. The maximum depths sampled were 83.8 meters at station 1, 61.0 meters at station 2, 71.6 meters at station 3, 43.0 meters at station 4, 47.2 meters at station 5, 32.9 meters at station 6, and 29.3 meters at station 7.

The lake sampling results are presented in full in Appendix D and are summarized in the following table.

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR FONTANA LAKE
STORET CODE 3704

PARAMETER	1ST SAMPLING (6/ 2/73) 7 SITES RANGE	MEAN	MEDIAN	2ND SAMPLING (8/21/73) 7 SITES RANGE	MEAN	MEDIAN	3RD SAMPLING (10/26/73) 7 SITES RANGE	MEAN	MEDIAN
TEMP (C)	9.8 - 24.0	15.7	15.3	16.4 - 27.6	22.6	22.5	16.5 - 21.3	20.1	20.5
DISS OXY (MG/L)	7.0 - 10.0	8.2	8.1	0.1 - 9.0	5.0	5.2	0.8 - 7.8	4.7	4.5
CNDCTVY (MCROMO)	50. - 50.	50.	50.	18. - 69.	26.	25.	22. - 46.	28.	27.
PH (STAND UNITS)	6.5 - 8.2	6.9	6.9	5.3 - 8.2	6.2	5.9	5.9 - 6.7	6.3	6.3
TOT ALK (MG/L)	10. - 16.	11.	10.	10. - 24.	12.	10.	10. - 14.	10.	10.
TOT P (MG/L)	0.009 - 0.135	0.037	0.030	0.006 - 0.059	0.014	0.010	0.005 - 0.190	0.017	0.010
ORTHO P (MG/L)	0.002 - 0.032	0.007	0.007	0.003 - 0.016	0.006	0.006	0.004 - 0.025	0.009	0.008
NO2+NO3 (MG/L)	0.120 - 0.700	0.302	0.260	0.060 - 0.970	0.345	0.240	0.120 - 0.870	0.538	0.630
AMMONIA (MG/L)	0.060 - 0.730	0.197	0.120	0.040 - 1.620	0.259	0.120	0.020 - 1.720	0.233	0.130
KJEL N (MG/L)	0.200 - 1.000	0.353	0.200	0.200 - 2.300	0.573	0.400	0.200 - 3.100	0.507	0.300
INORG N (MG/L)	0.190 - 1.050	0.500	0.450	0.160 - 1.790	0.604	0.450	0.250 - 2.190	0.771	0.740
TOTAL N (MG/L)	0.320 - 1.270	0.656	0.580	0.300 - 2.430	0.918	0.810	0.420 - 3.680	1.040	0.860
CHLRPYL A (UG/L)	0.8 - 4.6	2.4	3.2	2.3 - 6.1	4.6	4.7	1.3 - 5.1	2.8	2.7
SECCHI (METERS)	0.3 - 2.7	1.4	1.3	1.7 - 4.6	2.9	2.3	2.5 - 4.6	3.7	4.0

B. Biological characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Algal Units per ml
06/02/73 (stations 1, 2, 3, and 4)	1. Cyclotella	1,581
	2. Melosira	566
	3. Flagellates	189
	4. Tabellaria	71
	5. Asterionella	71
	Other genera	24
	Total	2,502
06/03/73 (stations 5, 6, & 7)	1. Cyclotella	2,202
	2. Flagellates	839
	3. Melosira	760
	4. Tabellaria	65
	5. Asterionella	65
	Other genera	93
	Total	4,024
08/21/73	1. Flagellates	894
	2. Cyclotella	623
	3. Blue-green filaments	244
	4. Dinoflagellates	81
	5. Melosira	54
	Other genera	271
	Total	2,167
10/26/73	1. Synedra	267
	2. Flagellates	187
	3. Cyclotella	178
	4. Tabellaria	125
	5. Melosira	98
	Other genera	81
	Total	936

2. Chlorophyll a -

Sampling Date	Station Number	Chlorophyll a (μg/l)
06/02-03/73	01	2.3
	02	2.3
	03	3.2
	04	3.5
	05	3.6
	06	0.8
	07	4.6
08/21/73	01	3.6
	02	4.7
	03	2.3
	04	3.8
	05	6.0
	06	5.8
	07	6.1
10/26/73	01	1.3
	02	1.5
	03	2.2
	04	2.8
	05	2.7
	06	4.0
	07	5.1

C. Limiting Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

a. Stations 1, 2, and 3 -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum yield (mg/l-dry wt.)
Control	0.004	0.656	0.1
0.050	0.054	0.656	9.4
0.050 P + 1.0 N	0.054	1.656	9.1
1.0 N	0.004	1.656	0.1

b. Stations 4, 5, 6, and 7 -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum yield (mg/l-dry wt.)
Control	0.008	0.244	0.1
0.050 P	0.058	0.244	4.5
0.050 P + 1.0 N	0.058	1.244	12.3
1.0 N	0.008	1.244	0.1

3. Discussion -

The control yields of the assay alga, *Selenastrum capricornutum*, indicate that the potential primary productivity of Fontana Lake was low at the time the samples were collected. The addition of phosphorus alone resulted in increased algal yields and indicates phosphorus limitation. Note that addition of only nitrogen resulted in yields the same as those of the controls.

The lake data obtained at the various sampling times further substantiate limitation by phosphorus. The mean N/P ratios were 71/1 or greater on all occasions.

IV. NUTRIENT LOADINGS
(See Appendix E for data)

For the determination of nutrient loadings, the North Carolina National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page v), except for the high runoff months of January and February when two samples were collected. Sampling was begun in March, 1973, and was completed in February, 1974.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the North Carolina District Office of the U.S. Geological Survey for the tributary sites nearest the lake.

In this report, nutrient loads for sampled tributaries were determined by using a modification of a U.S. Geological Survey computer program for calculating stream loadings*. Nutrient loads shown are those measured minus point-source loads, if any.

Nutrient loads for unsampled "minor tributaries and immediate drainage" ("ZZ" of U.S.G.S.) were estimated using the means of the nutrient loads, in $kg/km^2/year$, at stations C-1 and E-1 and multiplying the means by the ZZ area in km^2.

The operator of the Western Carolina University wastewater treatment plant provided monthly effluent samples and corresponding flow data which were used to calculate the nutrient loads. Sylva, Bryson

* See Working Paper No. 175.

City, and Dillsboro did not participate in the sampling program. Nutrient loads from Sylva and Bryson City, which have secondary treatment, were estimated at 1.134 kg P and 3.401 kg N/capita/year. Nutrient loads from Dillsboro, which has no waste treatment, were estimated at 1.587 kg P and 4,623 kg N/capita/year.

A. Waste Sources:

1. Known muncipal -

Name	Pop. Served	Treatment	Mean Flow (m^3/d)	Receiving Water
Bryson City	1,290*	act. sludge	488.3**	Fontana Lake
Western Carolina U.	5,287***	trickling filter	2,001.3	Cullowhe Creek
Sylva	1,561*	act. sludge	590.8**	Scott Creek
Dillsboro	215*	none	81.4**	Tuckasegee River

2. Known industrial - None

* 1970 Census.
** Estimate based on 0.3785 m^3/capita/day.
*** Estimate based on actual mean flow; includes population of Cullowhee.

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	kg P/ yr	% of total
a. Tributaries (non-point load) -		
Little Tennesse River	52,360	42.2
Tuckasegee River	42,250	34.0
Alarka Creek	2,625	2.1
Nantahala River	5,180	4.2
Panther Creek	310	0.3
Stecoah Creek	1,105	0.9
b. Minor tributaries & immediate drainage (non-point load) -	13,320	10.7
c. Known municipal STP's -		
Bryson City	1,465	1.2
Dillsboro	340	0.3
Western Carolina U.	2,670	2.1
Sylva	1,770	1.4
d. Septic tanks* -	25	<0.1
e. Known industrial - None	-	-
f. Direct precipitation** -	755	0.6
Total	124,175	100.0

2. Outputs -

Lake outlet - Little Tennessee R. 65,830

3. Net annual P accumulation - 58,345 kg.

* Estimate based on 50 lakeshore dwellings, four campsites, and three parks; see Working Paper No. 175.
** See Working Paper No. 175.

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	kg N/ yr	% of total
a. Tributaries (non-point load) -		
Little Tennessee River	566,520	15.0
Tuckasegee River	2,565,510	67.9
Alarka Creek	42,690	1.1
Nantahala River	273,530	7.3
Panther Creek	6,155	0.2
Stecoah Creek	29,305	0.8
b. Minor tributaries & immediate drainage (non-point load) -	228,520	6.1
c. Known municipal STP's -		
Bryson City	4,390	0.1
Dillsboro	915	<0.1
Western Carolina U.	7,695	0.2
Sylva	5,310	0.1
d. Septic tanks* -	920	<0.1
e. Known industrial - None	-	-
f. Direct precipitation** -	46,615	1.2
Total	3,778,075	100.0

2. Outputs -

Lake outlet - Little Tennessee River	5,279,760

3. Net annual N loss - 1,501,685 kg.

* Estimate based on 50 lakeshore dwellings, four campsites, and three parks; see Working Paper No. 175.
** See Working Paper No. 175.

D. Mean Annual Non-point Nutrient Export by Subdrainage Area:

Tributary	kg P/km²/yr	kg N/km²/yr
Little Tennessee River	46	497
Tuckasegee River	25	1,503
Alarka Creek	32	528
Nantahala River	12	640
Panther Creek	11	214
Stecoah Creek	41	1,077

E. Yearly Loading Rates:

In the following table, the existing phosphorus loading rates are compared to those proposed by Vollenweider (Vollenweider and Dillon, 1974). Essentially, his "dangerous" rate is the rate at which the receiving water would become eutrophic or remain eutrophic; his "permissible" rate is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A mesotrophic rate would be considered one between "dangerous" and "permissible".

Note that Vollenweider's model may not be applicable to water bodies with short hydraulic retention times.

	Total Phosphorus		Total Nitrogen	
	Total	Accumulated	Total	Accumulated
grams/m²/yr	2.88	1.35	87.5	loss*

Vollenweider loading rates for phosphorus (g/m²/yr) based on mean depth and mean hydraulic retention time of Fontana Lake:

"Dangerous" (eutrophic rate)	1.74
"Permissible" (oligotrophic rate)	0.87

* The apparent loss of nitrogen from the lake during the sampling year is most probably due to nitrogen solubilization in bottom sludges in the Tuckasegee River Arm (see page 3).

V. LITERATURE REVIEWED

Louder, Darrell E., and W. Donald Baker, 1966. Some interesting limnological aspects of Fontana Reservoir. Proc. 20th Ann. Conf. SE Assoc. Game & Fish Comm., Asheville, NC, pp. 380-390.

Vollenweider, R. A., and P. J. Dillon, 1974. The application of the phosphorus loading concept to eutrophication research. Natl. Res. Council of Canada Publ. No. 13690, Canada Centre for Inland Waters, Burlington, Ontario.

VI. APPENDICES

APPENDIX A

LAKE RANKINGS

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
1	3719	LAKE WACCAMAW	534
2	3716	SANTEELAH LAKE	446
3	3711	MOUNTAIN ISLAND LAKE	419
4	3707	HIWASSEE LAKE	414
5	3704	FONTANA LAKE	392
6	3713	LAKE NORMAN	346
7	3708	LAKE JAMES	334
8	3710	LOOKOUT SHOALS	327
9	3715	RHODHISS LAKE	296
10	3705	LAKE HICKORY	283
11	3717	LAKE TILLERY	246
12	3709	LAKE JUNALUSKA	220
13	3702	BLEWETT FALLS LAKE	200
14	3718	WATERVILLE RESERVOIR	140
15	3701	BADIN LAKE	124
16	3706	HIGH ROCK LAKE	76

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P	INDEX NO
3701	BADIN LAKE	33 (5)	7 (1)	27 (4)	27 (4)	3 (0)	27 (4)	124
3702	BLEWETT FALLS LAKE	7 (1)	13 (2)	7 (1)	73 (11)	93 (14)	7 (1)	200
3704	FONTANA LAKE	100 (15)	33 (5)	93 (14)	100 (15)	3 (0)	63 (9)	392
3705	LAKE HICKORY	27 (4)	60 (9)	53 (8)	13 (2)	80 (12)	50 (7)	283
3706	HIGH ROCK LAKE	13 (2)	20 (3)	0 (0)	0 (0)	23 (2)	20 (3)	76
3707	HIWASSEE LAKE	87 (13)	80 (12)	87 (13)	47 (7)	50 (7)	63 (9)	414
3708	LAKE JAMES	60 (9)	87 (13)	80 (12)	7 (1)	23 (2)	77 (11)	334
3709	LAKE JUNALUSKA	47 (7)	27 (4)	43 (6)	20 (3)	50 (7)	33 (5)	220
3710	LOOKOUT SHOALS	53 (8)	47 (7)	60 (9)	67 (10)	60 (9)	40 (6)	327
3711	MOUNTAIN ISLAND LAKE	73 (11)	73 (11)	43 (6)	53 (8)	87 (13)	90 (13)	419
3713	LAKE NORMAN	67 (10)	53 (8)	73 (11)	40 (6)	23 (2)	90 (13)	346
3715	RHODHISS LAKE	20 (3)	67 (10)	33 (5)	93 (14)	70 (10)	13 (2)	296
3716	SANTEELAH LAKE	93 (14)	93 (14)	100 (15)	60 (9)	23 (2)	77 (11)	446
3717	LAKE TILLERY	40 (6)	40 (6)	13 (2)	33 (5)	70 (10)	50 (7)	246
3718	WATERVILLE RESERVOIR	0 (0)	0 (0)	20 (3)	80 (12)	40 (6)	0 (0)	140
3719	LAKE WACCAMAW	80 (12)	100 (15)	67 (10)	87 (13)	100 (15)	100 (15)	534

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500- MEAN SEC	MEAN CHLORA	15- MIN DO	MEDIAN DISS ORTHO P
3701	BADIN LAKE	0.042	0.680	466.750	7.190	14.900	0.012
3702	BLEWETT FALLS LAKE	0.090	0.655	476.889	4.167	10.800	0.034
3704	FONTANA LAKE	0.011	0.550	392.650	3.438	14.900	0.007
3705	LAKE HICKORY	0.047	0.320	461.000	7.275	13.400	0.008
3706	HIGH ROCK LAKE	0.090	0.580	477.454	14.283	14.800	0.017
3707	HIWASSEE LAKE	0.015	0.240	420.555	5.678	14.200	0.007
3708	LAKE JAMES	0.020	0.160	428.866	7.660	14.800	0.006
3709	LAKE JUNALUSKA	0.031	0.560	462.000	7.233	14.200	0.009
3710	LOOKOUT SHOALS	0.026	0.370	459.167	4.200	13.800	0.008
3711	MOUNTAIN ISLAND LAKE	0.018	0.270	462.000	5.580	12.800	0.005
3713	LAKE NORMAN	0.019	0.330	446.667	5.807	14.800	0.005
3715	RHODHISS LAKE	0.061	0.305	462.111	3.578	13.600	0.019
3716	SANTEELAH LAKE	0.011	0.160	366.400	5.360	14.800	0.006
3717	LAKE TILLERY	0.040	0.470	468.600	6.827	13.600	0.008
3718	WATERVILLE RESERVOIR	0.103	0.860	468.333	3.817	14.400	0.041
3719	LAKE WACCAMAW	0.018	0.120	455.667	3.583	9.800	0.004

APPENDIX B

CONVERSION FACTORS

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107×10^{-4} = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 = cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

APPENDIX C

TRIBUTARY FLOW DATA

[illegible] 1/10/75

LAKE CODE 3704 [illegible]

TOTAL DRAINAGE AREA OF LAKE(SQ KM) [illegible]

TRIBUTARY	SUB-DRAINAGE AREA(SQ KM)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	NORMALIZED FLOWS(CMS) JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
3704A1	4068.9	116.27	155.17	[illegible]	[illegible]	71.35	[illegible]	105.31	117.68	124.31	132.81	128.25	242.19	115.46
3704A2	1139.6	37.17	45.73	[illegible]	[illegible]	[illegible]	[illegible]	20.25	17.47	16.68	18.29	20.81	28.91	29.59
3704B1	1706.8	54.74	[illegible]	71.13	[illegible]	[illegible]	37.47	33.95	29.90	24.81	25.32	29.59	42.93	43.58
3704C1	86.8	4.67	[illegible]	[illegible]	[illegible]	[illegible]	2.27	2.27	1.70	1.42	1.42	1.98	3.26	3.04
3704D1	427.3	17.41	[illegible]	[illegible]	[illegible]	[illegible]	15.72	13.45	13.45	13.88	12.46	11.75	12.88	15.59
3704E1	28.7	[illegible]	1.13	1.13	[illegible]	[illegible]	0.45	0.48	0.40	0.27	0.28	0.42	0.68	0.65
3704F1	27.2	[illegible]	[illegible]	1.76	1.42	1.02	0.76	0.76	0.57	0.45	0.48	0.68	1.08	1.02
3704Z7	658.4	[illegible]	[illegible]	37.10	[illegible]	[illegible]	16.14	16.14	11.75	8.78	8.78	13.31	22.94	21.40

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 4068.9
SUM OF SUB-DRAINAGE AREAS = 4068.9

TOTAL FLOW IN = 1382.97
TOTAL FLOW OUT = 1382.91

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
3704A1	3	73	126.[illegible]	25	[illegible]				
	4	73	[illegible]	[illegible]	[illegible]				
	5	73	175.18	27	175.03				
	6	73	194.82						
	7	73	165.37	1	193.97	24	201.05		
	8	73	160.52	19	[illegible]				
	9	73	65.98	9	[illegible]				
	10	73	123.74	13	127.14				
	11	73	127.63	11	143.28				
	12	73	147.53	9	179.53				
	1	74	238.14	6	251.17	20	251.74		
	2	74	[illegible]	16	257.68	24	254.85		
3704A2	3	73	[illegible]	25	[illegible]				
	4	73	[illegible]	24	[illegible]				
	5	73	[illegible]	27	[illegible]				
	6	73	[illegible]						
	7	73	[illegible]	1	[illegible]	[illegible]	22.65		
	8	73	[illegible]	14	[illegible]				
	9	73	15.43	[illegible]	[illegible]				
	10	73	12.44	13	[illegible]				
	11	73	[illegible]	1	[illegible]				
	12	73	[illegible]	[illegible]	[illegible]				
	1	74	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
	2	74	[illegible]	1	[illegible]	24	74.76		

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TRIBUTARY FLOW INFORMATION FOR NORTH CAROLINA 1/10/75

LAKE CODE 3704 FONTANA LAKE

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
370481	3	73	167.89	25	90.4				
	4	73	79.57	29	112.75				
	5	73	40.05	27	74.76				
	6	73	67.11						
	7	73	39.36	1	46.72	29	30.58		
	8	73	34.26	19	28.88				
	9	73	24.43	9	24.42				
	10	73	17.70	12	16.94				
	11	73	28.60	10	15.57				
	12	73	65.94	8	44.73				
	1	74	108.74	5	151.50	20	59.47		
	2	74	101.66	9	107.65	24	101.94		
370401	3	73	5.66	25	3.46				
	4	73	3.54	29	6.86				
	5	73	3.68	27	3.11				
	6	73	2.55						
	7	73	1.42	1	1.84	29	1.56		
	8	73	1.27	19	1.39				
	9	73	0.99	9	1.76				
	10	73	0.85	13	0.59				
	11	73	1.84	10	0.91				
	12	73	3.95	8	2.74				
	1	74	6.43	5	4.91	20	3.26		
	2	74	5.10	9	5.66	24	4.81		
370401	3	73	26.40	25	31.15				
	4	73	24.64	29	29.73				
	5	73	28.32	27	27.75				
	6	73	22.09						
	7	73	16.44	1	17.27	29	6.23		
	8	73	16.49	19	17.41				
	9	73	13.52	9	18.97				
	10	73	5.50	12	11.61				
	11	73	7.65	10	13.45				
	12	73	16.16	8	17.56				
	1	74	33.41	5	40.78	20	26.33		
	2	74	35.40	9	34.83	24	33.70		
370481	3	73	2.12	25	0.85				
	4	73	1.70	28	2.41				
	5	73	1.96	27	1.13				
	6	73	1.34						
	7	73	0.39	1	0.65	29	0.57		
	8	73	0.57	19	0.43				
	9	73	0.62	9	0.62				
	10	73	0.37	13	0.29				
	11	73	1.74	11	0.31				
	12	73	1.64	9	0.83				
	1	74	2.53	6	2.54	20	1.13		
	2	74	1.54	10	1.71	24	1.70		

TRIBUTARY FLOW INFORMATION FOR NORTH CAROLINA 1/10/75

LAKE CODE 3704 FONTANA LAKE

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
3704F1	3	73	1.98	25	2.27				
	4	73	1.90	28	2.97				
	5	73	2.27	27	3.11				
	6	73	1.56						
	7	73	0.91	1	0.96	29	0.57		
	8	73	0.79	19	0.51				
	9	73	0.57	9	0.59				
	10	73	0.42	13	0.42				
	11	73	0.82	11	0.37				
	12	73	1.98	9	1.47				
	1	74	2.83	6	2.55	20	1.13		
	2	74	1.70	10	1.70	24	2.55		
3704ZZ	3	73	36.81						
	4	73	26.90						
	5	73	28.32						
	6	73	16.99						
	7	73	12.74						
	8	73	11.33						
	9	73	8.50						
	10	73	7.08						
	11	73	14.16						
	12	73	22.65						
	1	74	39.64						
	2	74	37.38						

APPENDIX D

PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 75/01/07

370401
35 27 13.0 083 48 16.0
FONTANA LAKE
37173 NORTH CAROLINA

11EPALES 2111202
3 0300 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/06/02	09 45	0000	20.5		108	50K	7.00	10K	0.210	0.500	0.410	0.003
	09 45	0005	20.1	9.0		50K	7.00	10K	0.190	0.300	0.410	0.002K
	09 45	0027	17.5	9.0		50K	7.00					
	09 45	0050	15.8	8.2		50K	6.80	11	0.400	0.400	0.380	0.007
	09 45	0080	14.1	8.4		50K	6.80					
	09 45	0110	12.9	8.1		50K	6.60	10K	0.120	0.200K	0.580	0.006
	09 45	0150	11.6	8.4		50K	6.60	10K	0.070	0.200K	0.680	0.004
	09 45	0200	11.0	8.4		50K	6.50	10	0.060	0.200K	0.680	0.008
	09 45	0250	10.6	8.0		50K	6.60	10	0.090	0.200K	0.700	0.003
	09 45	0275	10.2	7.8		50K	6.60	10K	0.060	0.200K	0.600	0.005
73/08/21	12 35	0000	26.8		180	27	8.20	14	0.140	0.500	0.210	0.010
	12 35	0005	26.5	8.0		23	8.00	10K	0.140	0.300	0.200	0.006
	12 35	0015	26.1	7.8		25	7.70	10K	0.210	0.400	0.220	0.011
	12 35	0030	23.7	4.2		26	7.30	10K	0.380	0.700	0.330	0.006
	12 35	0050	22.3	3.6		22	6.90	10K	0.150	0.400	0.590	0.006
	12 35	0075	20.2	4.0		21	6.90	10K	0.050	0.200K	0.690	0.005
	12 35	0100	18.9	5.0		18	6.70	10K	0.040	0.200K	0.610	0.006
	12 35	0125	18.0	5.4		20	6.70	10K	0.040	0.200K	0.610	0.006
	12 35	0150	17.2	5.6		20	6.40	10K	0.050	0.200K	0.650	0.007
	12 35	0180	16.6	4.6		23	6.40	10K	0.040	0.200K	0.710	0.006
73/10/26	12 50	0000	20.6		168	27	6.50	10K	0.100	0.500	0.660	0.009
	12 50	0005	20.5	5.6		27	6.30	10K	0.080	0.200K	0.660	0.009
	12 50	0020	20.5	4.8		26	6.20	10K	0.080	0.200K	0.660	0.009
	12 50	0035	20.5	5.2		27	6.20	10K	0.080	0.200K	0.640	0.008
	12 50	0050	20.5	4.6		27	6.30	10K	0.080	0.200K	0.630	0.008
	12 50	0075	20.5	4.8		26	6.20	10K	0.080	0.200K	0.640	0.008
	12 50	0100	20.4	3.8		27	5.90	10K	0.060	0.200K	0.700	0.007
	12 50	0125	19.6	1.8		26	6.00	10K	0.030	0.200K	0.870	0.008
	12 50	0150	19.1	1.9		27	6.00	10K	0.020	0.200K	0.820	0.011
	12 50	0180	18.5	3.2		28	6.20	10K	0.030	0.200K	0.580	0.007
	12 50	0200	17.7	3.8		26	6.30	10K	0.030	0.200K	0.380	0.008

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/01/07

370401
35 27 13.0 083 48 16.0
FONTANA LAKE
37173 NORTH CAROLINA

11EPALES 2111202
3 0300 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/06/02	09 45	0000	0.014	2.3
	09 45	0005	0.011	
	09 45	0050	0.010	
	09 45	0110	0.009	
	09 45	0150	0.010	
	09 45	0200	0.010	
	09 45	0250	0.011	
	09 45	0275	0.011	
73/08/21	12 35	0000	0.008	3.6
	12 35	0005	0.008	
	12 35	0015	0.010	
	12 35	0030	0.008	
	12 35	0050	0.006	
	12 35	0075	0.006	
	12 35	0100	0.006	
	12 35	0125	0.006	
	12 35	0150	0.007	
	12 35	0180	0.011	
73/10/26	12 50	0000	0.007	1.3
	12 50	0005	0.007	
	12 50	0020	0.006	
	12 50	0035	0.006	
	12 50	0050	0.006	
	12 50	0075	0.007	
	12 50	0100	0.006	
	12 50	0125	0.006	
	12 50	0150	0.008	
	12 50	0180	0.005	
	12 50	0200	0.006	

STORET RETRIEVAL DATE 75/01/07

370402
35 26 42.0 083 43 37.0
FONTANA LAKE
37173 NORTH CAROLINA

11EPALES 2111202
3 0170 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/06/02	13 00	0000	22.2		96	50K	6.90	10K	0.250	0.600	0.400	0.003
	13 00	0005	21.5	9.4		50K	6.90					
	13 00	0027	17.1	7.6		50K	6.80					
	13 00	0050	15.8	7.8		50K	6.70					
	13 00	0075	14.3	7.6		50K	6.70	10K	0.420	0.500	0.360	0.010
	13 00	0100	13.3	8.0		50K	6.70	10K	0.270	0.400	0.450	0.004
	13 00	0125	12.1	7.6		50K	6.60	10K	0.110	0.200K	0.680	0.007
	13 00	0165	11.3	7.4		50K	6.50					
73/08/21	13 15	0000	26.7		162	26	6.40	10K	0.190	0.300	0.250	0.004
	13 15	0005	26.7	7.8		25	6.70	10K	0.180	0.200	0.240	0.004
	13 15	0015	25.9	7.0		24	6.40	10K	0.340	0.600	0.310	0.006
	13 15	0030	23.8	0.2		28	5.80	10K	0.110	0.200K	0.970	0.005
	13 15	0050	22.2	1.0		25	5.80	10K	0.070	0.200K	0.930	0.004
	13 15	0075	20.1	1.8		23	5.80	10K	0.060	0.200K	0.910	0.006
	13 15	0100	18.8	2.9		22	5.80	10K	0.080	0.200K	0.810	0.004
	13 15	0125	17.9	3.8		21	5.80	10K	0.050	0.200K	0.750	0.005
	13 15	0140	17.4	4.2		19	5.80	10K	0.050	0.200K	0.720	0.004
73/10/26	13 40	0000	20.8		180	30	6.40	10K	0.160	0.400	0.740	0.007
	13 40	0010	20.6	4.4		29	6.20	10K	0.160	0.200	0.750	0.008
	13 40	0025	20.6	4.4		28	6.30	10K	0.170	0.200	0.750	0.010
	13 40	0050	20.6	4.6		28	6.30	10K	0.160	0.200	0.750	0.008
	13 40	0075	20.6	4.6		28	6.20	10K	0.160	0.200	0.740	0.007
	13 40	0100	20.2	0.8		26	6.00	10K	0.030	0.200K	0.800	0.008
	13 40	0150	19.1	4.6		26	6.30	10K	0.030	0.200K	0.330	0.010
	13 40	0200	17.9	4.0		26	6.30	10K	0.030	0.200K	0.280	0.009

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/01/07

370402
35 26 42.0 083 43 37.0
FONTANA LAKE
37173 NORTH CAROLINA

11EPALES 2111202
3 0170 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/06/02	13 00	0000	0.017	2.3
	13 00	0075	0.011	
	13 00	0100	0.010	
	13 00	0125	0.010	
73/08/21	13 15	0000	0.007	4.7
	13 15	0005	0.008	
	13 15	0015	0.009	
	13 15	0030	0.007	
	13 15	0050	0.006	
	13 15	0075	0.006	
	13 15	0100	0.006	
	13 15	0125	0.007	
	13 15	0140	0.008	
73/10/26	13 40	0000	0.006	1.5
	13 40	0010	0.006	
	13 40	0025	0.006	
	13 40	0050	0.006	
	13 40	0075	0.006	
	13 40	0100	0.006	
	13 40	0150	0.009	
	13 40	0200	0.008	

STORET RETRIEVAL DATE 75/01/07

370403
35 26 09.0 083 35 08.0
FONTANA LAKE
37173 NORTH CAROLINA

11EPALES
3

2111202
0240 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/06/02	14 00	0000	24.0		70	50K	7.80					
	14 00	0005	21.8	9.6		50K	7.50					
	14 00	0017	18.3	8.0		50K	7.10					
	14 00	0020	17.6	7.8		50K	6.90					
	14 00	0030	17.0	8.0		50K	6.80					
	14 00	0050	16.2	8.0		50K	6.70					
	14 00	0075	14.8	7.7		50K	6.70	10K	0.110	0.200K	0.160	0.007
	14 00	0100	12.9	9.1		50K	6.70	10K	0.080	0.200K	0.120	0.002
	14 00	0150	11.5	8.6		50K	6.70	10	0.140	0.200K	0.320	0.004
	14 00	0200	10.8	8.0		50K	6.60	10K	0.170	0.200K	0.380	0.005
	14 00	0235	10.5	7.0		50K	6.50	12	0.210	0.300	0.410	0.006
73/08/21	13 55	0000	27.4		136	27	6.20	10K	0.310	0.600	0.230	0.007
	13 55	0005	27.3	4.8		26	6.10	10K	0.350	0.600	0.230	0.005
	13 55	0015	26.5	5.8		31	6.00	10K	0.600	0.900	0.250	0.005
	13 55	0030	23.7	2.6		35	5.90	10	1.250	1.500	0.440	0.007
	13 55	0050	22.3	1.6		24	5.80	10K	0.060	0.400	0.830	0.005
	13 55	0075	20.3	5.2		22	5.80	10	0.060	0.200K	0.250	0.004
	13 55	0100	18.9	6.0		21	5.90	10	0.060	0.200K	0.130	0.005
	13 55	0130	17.8	5.4		20	5.80	10K	0.040	0.200K	0.300	0.004
	13 55	0160	16.9	4.6		20	5.80	10K	0.060	0.200K	0.450	0.007
	13 55	0190	16.4	2.4		23	5.60	11	0.090	0.200K	0.360	0.006
73/10/26	14 20	0000	21.0		180	30	6.30	10K	0.360	0.400	0.760	0.010
	14 20	0010	20.7	4.2		31	6.20	10K	0.370	0.500	0.760	0.008
	14 20	0030	20.6	4.0		30	6.20	10K	0.340	0.600	0.740	0.007
	14 20	0050	20.6	4.0		33	6.10	14	0.320		0.750	0.025
	14 20	0100	20.2	3.6		37	6.40	10K	0.850	1.100	0.320	0.005
	14 20	0170	18.8	3.4		36	6.30	10K	1.720	1.900	0.470	0.012

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/01/07

370403
35 26 09.0 083 35 08.0
FONTANA LAKE
37173 NORTH CAROLINA

11EPALES 2111202
3 0240 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/06/02	14 00	0000		3.2
	14 00	0075	0.053	
	14 00	0100	0.032	
	14 00	0150	0.017	
	14 00	0200	0.016	
	14 00	0235	0.019	
73/08/21	13 55	0000	0.008	2.3
	13 55	0005	0.008	
	13 55	0015	0.010	
	13 55	0030	0.009	
	13 55	0050	0.009	
	13 55	0075	0.006	
	13 55	0100	0.009	
	13 55	0130	0.007	
	13 55	0160	0.009	
	13 55	0190	0.012	
73/10/26	14 20	0000	0.010	2.2
	14 20	0010	0.008	
	14 20	0030	0.010	
	14 20	0100	0.016	
	14 20	0170	0.041	

STORET RETRIEVAL DATE 75/01/07

370404
35 26 32.0 083 33 19.0
FONTANA LAKE
37173 NORTH CAROLINA

11EPALES 2111202
3 0145 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/06/02	15 30	0000	21.7			50K	6.90	10K	0.390	1.000	0.270	0.006
	15 30	0005	20.7	9.6		50K	7.30	10K	0.320	0.500	0.230	0.004
	15 30	0015	18.4	8.4		50K	7.00	10K	0.560	0.700	0.260	0.006
	15 30	0030	15.7	8.4		50K	6.90	10K	0.620	0.700	0.260	0.006
	15 30	0050	15.2	8.4		50K	6.90	10K	0.520	0.600	0.280	0.006
	15 30	0075	14.5	7.6		50K	6.70	10K	0.440	0.800	0.330	0.007
	15 30	0100	11.8	7.2		50K	6.70	10K	0.730	0.900	0.320	0.006
	15 30	0120	10.6	7.0		50K	6.60	10K	0.700	0.800	0.340	0.007
	15 30	0141	10.1									
73/08/21	14 30	0000	26.7		90	28	5.90	10K	0.450	0.900	0.240	0.006
	14 30	0005	26.7	7.8		23	5.90	10K	0.420	0.800	0.230	0.004
	14 30	0015	25.3	5.4		32	5.80	11	0.960	1.700	0.270	0.004
	14 30	0030	23.7	5.8		31	5.70	11	1.310	1.800	0.280	0.005
	14 30	0050	22.4	4.2		39	5.60	11	1.460	2.100	0.330	0.007
	14 30	0075	20.1	0.4		24	5.30	10K	0.160	0.700	0.960	0.004
	14 30	0100	19.0	0.2		27	5.30	10K	0.420	0.900	0.660	0.003
	14 30	0115	18.5	0.1		37	5.40	15	0.890	1.300	0.130	0.004
	14 30	0130	18.0	4.4		69	5.40	24	1.620	2.300	0.070	0.003
73/10/26	15 00	0000	20.8		120	34	6.20	10K	0.470	0.800	0.740	0.013
	15 00	0005	20.8	4.4		33	6.20	11	0.480	0.600	0.750	0.010
	15 00	0015	20.6	4.2		32	6.20	12	0.470	0.700	0.750	0.008
	15 00	0035	20.6	3.6		34	6.10	12	0.490	0.700	0.750	0.008
	15 00	0075	20.5	4.4		33	6.20	10K	0.500	0.900	0.760	0.011
	15 00	0100	19.3	3.8		42	6.40	10K	0.600	3.000	0.560	0.016
	15 00	0115	18.9	4.0		46	6.40	10K	0.600	3.100	0.580	0.014

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/01/07

370404
35 26 32.0 083 33 19.0
FONTANA LAKE
37173 NORTH CAROLINA

11EPALES 2111202
3 0145 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/06/02	15 30	0000	0.018	3.5
	15 30	0006	0.015	
	15 30	0015	0.025	
	15 30	0030	0.016	
	15 30	0050	0.049	
	15 30	0075	0.135	
	15 30	0100	0.029	
	15 30	0120	0.014	
73/08/21	14 30	0000	0.008	3.8
	14 30	0005	0.008	
	14 30	0015	0.010	
	14 30	0030	0.012	
	14 30	0050	0.016	
	14 30	0075	0.008	
	14 30	0100	0.012	
	14 30	0115	0.018	
	14 30	0130	0.039	
73/10/26	15 00	0000	0.017	2.8
	15 00	0005	0.013	
	15 00	0015	0.010	
	15 00	0035	0.008	
	15 00	0075	0.013	
	15 00	0100	0.060	
	15 00	0115	0.190	

STORET RETRIEVAL DATE 75/01/07

370405
35 24 47.0 083 33 29.0
FONTANA LAKE
37173 NORTH CAROLINA

11EPALES 2111202
3 0159 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/06/03	09 00	0000	22.8		30	50K	8.20	10K	0.070	0.300	0.170	0.005
	09 00	0006	21.4	10.0		50K	8.10	10K	0.070	0.200K	0.170	0.005
	09 00	0015	17.4	7.8		50K	7.70	10K	0.150	0.200K	0.280	0.008
	09 00	0030	16.6	8.0		50K	7.40	10K	0.170	0.200K	0.290	0.009
	09 00	0050	15.2	8.2		50K	7.30	10	0.130	0.200K	0.220	0.010
	09 00	0075	13.8	8.6		50K	7.20	10K	0.110	0.500	0.190	0.008
	09 00	0100	12.1	9.0		50K	7.20	10K	0.060	0.400	0.120	0.007
	09 00	0125	10.5	9.0		50K	7.10	10K	0.060	0.400	0.160	0.007
	09 00	0155	9.8	8.0		50K	7.00	10K	0.070	0.500	0.210	0.007
73/08/21	14 05	0000	27.4		84	26	7.30	13	0.170	1.000	0.180	0.011
	14 05	0005	27.2	8.0		27	6.90	11	0.130	0.600	0.180	0.010
	14 05	0015	24.5	6.0		27	6.20	13	0.120	0.300	0.240	0.016
	14 05	0030	23.8	5.8		27	5.90	14	0.120	0.500	0.250	0.012
	14 05	0050	22.3	6.6		25	5.80	14	0.080	0.400	0.120	0.006
	14 05	0075	20.4	6.6		24	5.80	15	0.150	0.300	0.160	0.005
	14 05	0100	19.0	7.2		22	5.60	14	0.080	0.400	0.080	0.007
	14 05	0125	17.8	2.2		28	5.40	16	0.200	0.500	0.180	0.006
73/10/26	16 15	0000	21.3		156	24	6.60	10K	0.160	0.400	0.410	0.008
	16 15	0010	20.7	6.2		24	6.60	10K	0.140	0.400	0.400	0.008
	16 15	0025	20.7	5.8		24	6.40	10K	0.140	0.400	0.410	0.008
	16 15	0050	20.6	6.0		24	6.40	10K	0.130	0.300	0.350	0.004
	16 15	0090	20.5	6.0		24	6.50	10K	0.120	0.400	0.290	0.006
	16 15	0108	19.8	6.0		25	6.50	10K	0.120	0.400	0.220	0.005

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/01/07

370465
35 24 47.0 083 33 29.0
FONTANA LAKE
37173 NORTH CAROLINA

11EPALES 2111202
3 0159 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/06/03	09 00	0000	0.030	3.6
	09 00	0006	0.030	
	09 00	0015	0.077	
	09 00	0030	0.079	
	09 00	0050	0.082	
	09 00	0075	0.040	
	09 00	0100	0.018	
	09 00	0125	0.015	
	09 00	0155	0.064	
73/08/21	14 05	0000	0.012	6.0
	14 05	0005	0.011	
	14 05	0015	0.017	
	14 05	0030	0.013	
	14 05	0050	0.011	
	14 05	0075	0.011	
	14 05	0100	0.015	
	14 05	0125	0.034	
73/10/26	16 15	0000	0.010	2.7
	16 15	0010	0.010	
	16 15	0025	0.010	
	16 15	0050	0.007	
	16 15	0090	0.030	
	16 15	0108	0.033	

STORET RETRIEVAL DATE 75/01/07

370406
35 22 52.0 083 33 17.0
FONTANA LAKE
37173 NORTH CAROLINA

11EPALES
3

2111202
0112 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/06/03	10 00	0000	21.5		12	50K	7.00	13	0.080	0.200K	0.240	0.009
	10 00	0006	19.9	8.5		50K	7.00	12	0.080	0.200K	0.220	0.007
	10 00	0015	18.2	8.4		50K	6.90	12	0.080	0.200K	0.230	0.011
	10 00	0030	16.5	8.4		50K	6.90	12	0.090	0.200K	0.250	0.008
	10 00	0050	15.3	8.6		50K	6.90	12	0.090	0.200K	0.220	0.008
	10 00	0070	13.7	9.0		50K	6.80	13	0.110	0.200K	0.170	0.007
	10 00	0090	13.0	8.9		50K	6.80	11	0.120	0.200K	0.160	0.011
	10 00	0108	11.9	7.2		50K	6.70	11	0.140	0.200K	0.160	0.008
73/08/21	16 30	0000	27.4		68	29	7.70	12	0.070	0.600	0.110	0.004
	16 30	0005	27.3	9.0		28	7.10	12	0.080	0.600	0.100	0.005
	16 30	0015	25.1	7.2		25	6.50	15	0.090	0.600	0.140	0.006
	16 30	0030	23.7	7.6		25	6.10	14	0.080	0.600	0.180	0.007
	16 30	0050	22.5	4.8		27	5.90	14	0.140	0.600	0.260	0.006
	16 30	0070	20.2			26	5.70	18	0.140	0.400	0.080	0.005
	16 30	0080	19.4	3.6		30	5.60	19	0.170	0.700	0.060	0.009
73/10/26	14 40	0000	20.7		100	22	6.60	10K	0.110	0.300	0.260	0.008
	14 40	0010	20.4	6.8		22	6.60	10	0.120	0.300	0.260	0.008
	14 40	0020	20.3	6.4		22	6.50	10	0.120	0.200	0.260	0.005
	14 40	0050	20.1	6.6		22	6.50	10K	0.110	0.200	0.240	0.008
	14 40	0063	16.5	7.8		22	6.60	10K	0.130	0.300	0.120	0.010

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/01/07

370465
35 24 47.0 083 33 29.0
FONTANA LAKE
37173 NORTH CAROLINA

11EPALES 2111202
3 0159 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/06/03	09 00	0000	0.030	3.6
	09 00	0006	0.030	
	09 00	0015	0.077	
	09 00	0030	0.079	
	09 00	0050	0.082	
	09 00	0075	0.040	
	09 00	0100	0.018	
	09 00	0125	0.016	
	09 00	0155	0.064	
73/08/21	14 05	0000	0.012	6.0
	14 05	0005	0.011	
	14 05	0015	0.017	
	14 05	0030	0.013	
	14 05	0050	0.011	
	14 05	0075	0.011	
	14 05	0100	0.015	
	14 05	0125	0.034	
73/10/26	16 15	0000	0.010	2.7
	16 15	0010	0.010	
	16 15	0025	0.010	
	16 15	0050	0.007	
	16 15	0090	0.030	
	16 15	0108	0.033	

STORET RETRIEVAL DATE 75/01/07

370406
35 22 52.0 083 33 17.0
FONTANA LAKE
37173 NORTH CAROLINA

11EPALES
3

2111202
0112 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/06/03	10 00	0000	21.5		12	50K	7.00	13	0.080	0.200K	0.240	0.009
	10 00	0006	19.9	8.5		50K	7.00	12	0.080	0.200K	0.220	0.007
	10 00	0015	18.2	8.4		50K	6.90	12	0.080	0.200K	0.230	0.011
	10 00	0030	16.5	8.4		50K	6.90	12	0.090	0.200K	0.250	0.008
	10 00	0050	15.3	8.6		50K	6.90	12	0.090	0.200K	0.220	0.008
	10 00	0070	13.7	9.0		50K	6.80	13	0.110	0.200K	0.170	0.007
	10 00	0090	13.0	8.9		50K	6.80	11	0.120	0.200K	0.160	0.011
	10 00	0108	11.9	7.2		50K	6.70	11	0.140	0.200K	0.160	0.008
73/08/21	16 30	0000	27.4		68	29	7.70	12	0.070	0.600	0.110	0.004
	16 30	0005	27.3	9.0		28	7.10	12	0.080	0.600	0.100	0.005
	16 30	0015	25.1	7.2		25	6.50	15	0.090	0.600	0.140	0.006
	16 30	0030	23.7	7.6		25	6.10	14	0.080	0.600	0.180	0.007
	16 30	0050	22.5	4.8		27	5.90	14	0.140	0.600	0.260	0.006
	16 30	0070	20.2			26	5.70	18	0.140	0.400	0.080	0.005
	16 30	0080	19.4	3.6		30	5.60	19	0.170	0.700	0.060	0.009
73/10/26	14 40	0000	20.7		100	22	6.60	10K	0.110	0.300	0.260	0.008
	14 40	0010	20.4	6.8		22	6.60	10	0.120	0.300	0.260	0.008
	14 40	0020	20.3	6.4		22	6.50	10	0.120	0.200	0.260	0.005
	14 40	0050	20.1	6.6		22	6.50	10K	0.110	0.200	0.240	0.008
	14 40	0063	16.5	7.8		22	6.60	10K	0.130	0.300	0.120	0.010

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/01/07

370406
35 22 52.0 083 33 17.0
FONTANA LAKE
37173 NORTH CAROLINA

11EPALES 2111202
3 0112 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/06/03	10 00	0000	0.052	0.8
	10 00	0006	0.051	
	10 00	0015	0.048	
	10 00	0030	0.064	
	10 00	0050	0.079	
	10 00	0070	0.046	
	10 00	0090	0.048	
	10 00	0108	0.043	
73/08/21	16 30	0000	0.018	5.8
	16 30	0005	0.020	
	16 30	0015	0.027	
	16 30	0030	0.039	
	16 30	0050	0.059	
	16 30	0070	0.035	
	16 30	0080	0.039	
73/10/26	14 40	0000	0.010	4.0
	14 40	0010	0.011	
	14 40	0020	0.011	
	14 40	0050	0.014	
	14 40	0063	0.064	

STORET RETRIEVAL DATE 75/01/07

370407
35 21 59.0 083 33 50.0
FONTANA LAKE
37173 NORTH CAROLINA

11EPALES 2111202
3 0100 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/06/03	12 30	0000	23.8		24	50L	7.30	10K	0.080	0.300	0.150	0.006
	12 30	0006	19.9	8.0		50L	7.10	10K	0.090	0.200	0.210	0.005
	12 30	0015	18.0	7.6		50L	6.90	10K	0.120	0.300	0.260	0.006
	12 30	0030	16.6	7.6		50L	6.90	14	0.170	0.400	0.280	0.013
	12 30	0050	15.3	8.5		50L	6.80	14	0.100	0.200K	0.170	0.007
	12 30	0072	13.6	9.2		50L	6.90	14	0.070	0.200K	0.120	0.006
	12 30	0096	12.4	7.8		50L	6.90	16	0.110	0.200K	0.160	0.007
73/08/21	16 50	0000	27.6		78	29	7.70	16	0.060	0.700	0.100	0.005
	16 50	0005	27.5	9.0		29	7.30	13	0.060	0.700	0.100	0.010
	16 50	0015	25.6	5.8		31	6.20	15	0.070	0.500	0.120	0.007
	16 50	0030	24.1	5.0		28	5.90	16	0.100	0.200K	0.110	0.004
	16 50	0045	22.7	6.8		24	5.80	14	0.090	0.200	0.100	0.015
	16 50	0060	21.7	8.0		25	5.80	14	0.120	0.300	0.170	0.010
73/10/26	14 17	0000	21.0		105	22	6.70	11	0.130	0.400	0.260	0.009
	14 17	0010	20.4	6.6		22	6.70	11	0.100	0.300	0.250	0.006
	14 17	0025	20.4	6.6		23	6.70	10	0.100	0.200	0.250	0.008
	14 17	0045	20.3	6.6		23	6.70	11	0.100	0.200	0.240	0.008

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/01/07

370407
35 21 59.0 083 33 50.0
FONTANA LAKE
37173 NORTH CAROLINA

11FWALES 2111202
3 0100 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/06/03	12 30	0000	0.029	4.6
	12 30	0006	0.053	
	12 30	0015	0.066	
	12 30	0030	0.098	
	12 30	0050	0.045	
	12 30	0072	0.038	
	12 30	0096	0.043	
73/08/21	16 50	0000	0.014	5.1
	16 50	0005	0.015	
	16 50	0015	0.016	
	16 50	0030	0.009	
	16 50	0045	0.014	
	16 50	0060	0.024	
73/10/26	14 17	0000	0.013	5.1
	14 17	0010	0.015	
	14 17	0025	0.010	
	14 17	0045	0.010	

APPENDIX E

TRIBUTARY and WASTEWATER TREATMENT PLANT DATA

STORET RETRIEVAL DATE 75/01/20

3704A1 LS3704A1
35 27 00.0 083 49 00.0
LITTLE TENNESSEE
37 7.5 FONTANA DAM
O/FONTANA LAKE
300 FT ABOVE HWY 28 BRDG BELO DAM
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/25	11 30		0.470	0.270	0.154	0.011	0.011
73/04/28	10 55		0.420	0.110	0.012	0.005K	0.010
73/05/27	13 00		0.530	0.100K	0.025	0.005K	0.030
73/07/01	12 15		0.410	0.260	0.019	0.008	0.010
73/07/29	11 15		0.560	1.470	0.087	0.011	0.025
73/08/19	12 30		0.520	1.900	0.126	0.005K	0.020
73/10/13	11 05		0.510	2.510	0.036	0.008	0.008
73/11/11	10 30		0.510	1.700	0.240	0.005K	0.005K
73/12/09	12 00		0.580		0.140	0.009	
74/01/06	18 00		0.620	0.625	0.128	0.008	0.037
74/01/20	13 00		0.470	0.900	0.124	0.008	0.020
74/02/10	13 00		0.410	0.700	0.075	0.005	0.020
74/02/24	13 00		0.320	0.900	0.075	0.005K	0.020

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/01/13

370442 L5370442
35 17 00.0 083 28 35.0
LITTLE TENNESSEE RIVER
37 MAP MACON CO
TVFONTANA
PROJ 1 MI NE STILES-SW JCT WITH HWY 28
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00631 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/25	11 45		0.176	0.220	0.023	0.007	0.040
73/04/24	15 50		0.147	0.220	0.014	0.011	0.050
73/05/27	12 05		0.115	0.203	0.033	0.009	0.030
73/07/01	11 10		0.122	0.310	0.046	0.013	0.045
73/07/29	10 45		0.144	0.590	0.044	0.016	0.085
73/08/19	10 40		0.216		0.154	0.013	0.198
73/10/13	17 45		0.654	0.300	0.021	0.017	0.055
73/11/15	10 05		0.216	0.300	0.076	0.032	0.055
73/12/04	10 20		0.224	0.300	0.028	0.016	0.060
74/01/05	11 04		0.252	0.300	0.040	0.008	0.070
74/01/20	11 15		0.205	0.700	0.036	0.012	0.035
74/02/10	11 35		0.213	0.600	0.035	0.010	0.065
74/02/24	12 10		0.158	0.300	0.030	0.005	0.075

STORET RETRIEVAL DATE 75/01/13

370481 LS370481
35 26 00.0 083 25 00.0
TUCKASEIGEE RIVER
37 MAP SWAIN CO
T/FONTANA LAKE
HWY 19 BRDG JUST E OF BRYSON CITY
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/25	12 40		0.176	1.250	0.850	0.005K	0.020
73/04/29	17 20		0.180	1.300	0.950	0.005K	0.020
73/05/27	14 15		0.154	2.100	1.370	0.010	0.025
73/07/01	12 50		0.132	1.380	1.090	0.005K	0.035
73/07/29	12 15		0.260	3.150	2.600	0.006	0.055
73/08/19	12 30		0.198	2.940	2.400	0.005K	0.085
73/10/12	19 30		0.120	4.200	3.500	0.010	0.030
73/11/19	14 25		0.128		5.040	0.012	0.025
73/12/08	12 40		0.224	0.900	0.450	0.008	0.020
74/01/05	13 00		0.290	0.700	0.264	0.005K	0.050
74/01/20	12 15		0.200	0.800	0.594	0.005K	0.015
74/02/03	14 25		0.160	0.500	0.390	0.005K	0.020
74/02/24	14 15		0.168	0.800	0.390	0.005K	0.040

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 74/01/13

3704C1 LS3704C1
35 23 30.0 083 31 00.0
ALARKA CREEK
37 7.5 NOLAND CR
T/FONTANA LAKE
RD 1309 BRDG 7 MI WSW OF BRYSON CITY
11EPALES 2111204
0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/25	12 15		0.175	0.225	0.029	0.005K	0.020
73/04/24	16 50		0.115	0.140	0.021	0.006	0.025
73/05/27	13 00		0.074	0.140	0.018	0.005K	0.034
73/07/01	10 35		0.115	0.230	0.048	0.005K	0.025
73/07/23	10 05		0.140	0.200	0.036	0.005K	0.035
73/08/19	09 45		0.147	0.502	0.210	0.005K	0.060
73/10/13	17 00		0.042	0.850	0.168	0.010	0.020
73/11/10	12 50		0.076	0.430	0.056	0.008	0.015
73/12/08	11 50		0.215	0.103	0.024	0.008	0.020
74/01/05	12 25		0.228	0.430	0.022	0.005K	0.030
74/01/20	10 30		0.200	0.400	0.025	0.012	0.015
74/02/03	13 05		0.156	0.130	0.025	0.005	0.020
74/02/24	11 25		0.152	0.408	0.040	0.005K	0.035

K VALUE KNOWN TO BE
LESS THAN INDICATED

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STORET RETRIEVAL DATE 75/01/13

370401 L5370401
35 20 00.0 083 35 30.0
NANTAHALA RIVER
37 MAP SWAIN CO
T/FONTANA LAKE
RD 1180 BRDG JUST N JCT WITH HWY 19
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/25	11	00	0.045	0.100K	0.008	0.005K	0.010
73/04/29	16	25	0.037	0.210	0.046	0.005K	0.010
73/05/27	11	10	0.015	0.690	0.022	0.005K	0.010
73/07/01	11	50	0.029	0.100K	0.039	0.005K	0.010
73/07/29	11	25	0.027	0.220	0.024	0.005K	0.015
73/09/19	11	00	0.023	3.100	0.115	0.008	0.010
73/10/12	18	00	0.013	0.100K	0.023	0.006	0.006
73/11/10	12	20	0.036	0.300	0.028	0.005K	0.010
73/12/08	11	05	0.036	0.100K	0.008	0.008	0.010
74/01/05	11	30	0.084	1.100	0.076	0.005K	0.015
74/01/20			0.056	0.400	0.028	0.005K	0.005
74/02/09	12	22	0.060	0.100K	0.010	0.005K	0.005
74/02/24	13	00	0.056	0.100K	0.015	0.005K	0.020

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 7[illegible]/[illegible]/13

3704E1 LS3704E1
35 24 00.0 083 37 30.0
PANTHER CREEK
37 MAP GRAHAM CO
T/FONTANA LAKE
HWY 28 BRDG 6.5 MI W JCT WITH HWY 19
11ERALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/25	12 45		0.037	0.100K	0.034	0.005K	0.010
73/05/27	11 05		0.134	0.440	0.198	0.005K	0.010
73/07/01	10 45		0.054	0.330	0.050	0.005K	0.010
73/07/29	09 45		0.054	0.280	0.072	0.011	0.020
73/08/19	13 30		0.054	0.300	0.120	0.005K	0.020
73/10/13	10 00		0.017	0.100K	0.016	0.008	0.020
73/11/11	11 00		0.088	0.250	0.024	0.008	0.010
73/12/09	11 30		0.088	0.300	0.032	0.012	0.015
74/01/06	14 00		0.060	0.100	0.016	0.008	0.015
74/01/20	11 00		0.032	0.100K	0.024	0.008	0.010
74/02/10	11 00		0.064	0.300	0.015	0.005	0.015
74/02/24	11 00		0.132	0.100K	0.020	0.005K	0.025

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/01/13

3704FI LS3704FI
35 24 00.0 083 40 30.0
STECOAH CREEK
37 7.5 TUSKEEGEE
T/FONTANA LAKE
RD 1236 BRDG 3 MI NNE OF STECOAH
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/25	12 20		0.230	0.170	0.023	0.006	0.025
73/04/28	10 10		0.210	0.180	0.033	0.009	0.025
73/05/27	12 00		0.150	0.540	0.150	0.011	0.065
73/07/01	11 30		0.140	1.480	0.079	0.010	0.030
73/07/29	10 30		0.240	0.330	0.018	0.011	0.045
73/08/19	11 30		0.220	2.520	0.138	0.008	0.045
73/10/13	10 25		0.168	0.550	0.024	0.015	0.030
73/11/11	09 55		0.168	1.000	0.060	0.012	0.020
73/12/09	11 00		0.270	0.100	0.020	0.012	0.025
74/01/06	18 00		0.390	0.300	0.024	0.012	0.035
74/01/20	12 00		0.330	0.200	0.032	0.012	0.020
74/02/10	12 00		0.276	0.600	0.022	0.010	0.030
74/02/24	12 00		0.245	0.100	0.015	0.010	0.045

STORET RETRIEVAL DATE 75/01/13

3704/A 1F3704/A P004993
35 16 45.0 [illegible] 11 00.0
WEST CAROLINA UNIVERSITY
37 [illegible] KNOXVILLE
T/FONTANA LAKE
COLLOWHEE CREEK
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/08/09	11 00		0.830	5.400	0.300	0.940	4.200	0.200	0.500
73/09/13	08 00								
CP(T)-			1.660	2.000	0.430	1.960	2.550		
73/09/13	16 00								
73/10/10	10 00								
CP(T)-			3.900	8.650	3.740	4.300	5.050		
73/10/10	14 00								
73/11/12	08 00								
CP(T)-			5.300	11.000	3.500	4.100	4.900	0.450	
73/11/12	15 00								
73/12/19			2.400	4.500	0.910	1.380	2.600	0.150	0.300
74/01/18	09 00								
CP(T)-			2.040	7.200	3.200	4.000	5.100	0.395	0.575
74/01/18	14 00								
74/02/13	09 00								
CP(T)-			2.500	7.900	3.000	3.360	4.100	0.650	0.500
74/02/13	14 00								
74/03/14	10 00		3.800	7.800	2.700	3.900	5.300	0.500	0.450
74/05/27	08 00								
CP(T)-			5.600	11.000	1.400	2.400	3.500	0.600	0.628
74/05/27	13 00								
74/06/20	10 00								
CP(T)-			5.520	4.400	1.500	1.312	2.550	0.600	0.628
74/06/20	15 00								
74/07/23	08 00								
CP(T)-			6.250	2.800	1.400	3.200	3.900	0.600	0.628
74/07/23	15 00								
74/08/22	08 00								
CP(T)-			0.040	4.600	0.050K		1.000	0.600	0.628
74/08/22	15 00								